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ABSTRACT

To assist researchers, practitioners, and students in locating journal articles, books, papers, and reports relevant to all aspects of document design, the Document Design Project staff at Carnegie-Mellon University (CMU) is designing and building a computerized reference library using the operating system ZOG. The library will include material from all the disciplines that apply to document design and will display on a video terminal screen not only the bibliographical information, but also such things as the abstract, a brief description of any experiments, and guidelines for applying the findings. The operating system ZOG is a rapid response, large network, menu selection system developed for person/machine communication by CMU's computer science department. (This booklet gives step-by-step directions for using the system, illustrates instructions with actual frames that would be displayed on the videoscreen, describes the contents of the library, and explains the four ways material can be accessed--by author, discipline, type of document, or guidelines for document designers.) (Author/AEA)

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DOCUMENT
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PROJECT

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Technical Report No. 7

A Computerized Reference Library Using Zog

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Lee W. Gregg
Joyce E. Hannah

A product of the Document Design Project funded by the National Institute of Education, DHEW, Washington, D.C.

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MERICAN INSTITUTES FOR RESEARCH
EGEL & GALE

A COMPUTERIZED REFERENCE LIBRARY USING ZOG

Lee W. Gregg and Joyce E. Hannah

Carnegie-Mellon University

March 1980

This report is part of the work being done under Contract #400-78-0043 of the National Institute of Education. The project officer is Dr. Ramsay Selden of the Teaching and Learning/Reading and Language Group. This report does not, however, necessarily reflect the views of the funding agency.

ABOUT THE DOCUMENT DESIGN PROJECT

In September 1978, the American Institutes for Research, Carnegie-Mellon University and Siegel & Gale, Inc., began the Document Design Project to foster clear and simple writing and design of public documents. The purpose of the Document Design Project is to help make forms, regulations, brochures, and other written materials easier for people to read, to understand, and to use. Funding for the project comes from the Teaching and Learning/Reading and Language group at the National Institute of Education.

The Project's goal is to increase the knowledge and skills of people who produce public documents. To accomplish this goal, the Document Design Project is

- conducting theoretical and applied research studies on language comprehension, on the ways in which skilled and unskilled writers work, and on problems associated with different document features;
- working directly with government and private agencies as they produce materials for public use;
- developing courses on writing and design for graduate students and undergraduates.

This report is one of a series of technical and explanatory papers resulting from our research.

If you have questions or comments on this report or on other work of the Document Design Project, contact Dr. Janice C. Redish, Director, The Document Design Project, AIR, (202) 342-5071, or Dr. Lee W. Gregg, Department of Psychology, CMU, (412) 578-2781.

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A Computerized Reference Library Using ZOG

Lee W. Gregg and Joyce E. Hannah[1]

Abstract

A computerized reference library, containing information about books, journal articles, papers, and reports, is being developed on an experimental basis by the Document Design Project staff at Carnegie-Mellon University. The library will include material from all the disciplines which apply to document design and will display on a video terminal screen not only the bibliographical information, but such things as the abstract, a brief description of any experiments, and guidelines for applying the findings. The information can be accessed in many ways, starting with author's name, discipline, type of document, or guidelines for document designers. The user can move around among these categories. The library utilizes ZOG, a rapid response, large network, menu selection system used for man-machine communication, which was developed in CMU's Computer Science Department.

INTRODUCTION

To assist researchers, practitioners, and students in locating journal articles, books, papers, and reports relevant to all aspects of document design, the Document Design Project staff at Carnegie-Mellon University (CMU) is designing and building a computerized reference library using the operating system ZOG. This library is available only on an experimental basis at CMU. In the future it may be more widely available. If put into operation, the library will continue to grow every year to include the latest works.

The system is practical only for use on a video computer terminal (one with a screen) that operates at 1200 baud or faster. The operating system, ZOG, is a rapid response, large network, menu selection system used for man-machine communication. It was developed in CMU's Computer Science

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[1]The authors wish to thank Donald L. McCracken of CMU's Computer Science Department for invaluable contributions to the design and construction of this library.

Department.

In this paper we show how to use the library and what it contains by "looking over the shoulder" of a user--describing her actions and showing you the frames she sees on the screen.

The word "user" throughout the body of this paper refers to a person who only "reads" the information contained in this library. One does not need to have any experience with computers in order to easily learn how to do this. Another class of "users" are those who add information to the library. These users will need to learn how to use ZED, the ZOG editor (Hannah, 1980).

For our readers with an interest in computer science, the references list papers about the operating system ZOG.

INSTRUCTIONS FOR USING THE SYSTEM

ZOG is very easy to use. The system itself contains instructions to aid either a new user or one who wishes to review the procedure.

A whole file (such as our reference library) is called a "net." It is composed of one or more subnets, which are chunks of related information. Each subnet contains one or more frames; a frame is a screenful of information. Figure 1 shows the first frame which the user will see.

A frame is composed of the following parts:

- frame number - a unique identification which appears in the upper right corner
- title - word or words in the upper left corner
- text - written material which may take up the whole frame, part of the frame, or not be present at all
- options - items which lead to other frames, as explained below
- local pads - items which perform special functions that differ from frame to frame
- global pads - items across the bottom (the same on every frame) which enable a user to move through the net in certain ways and perform certain functions, as explained below.

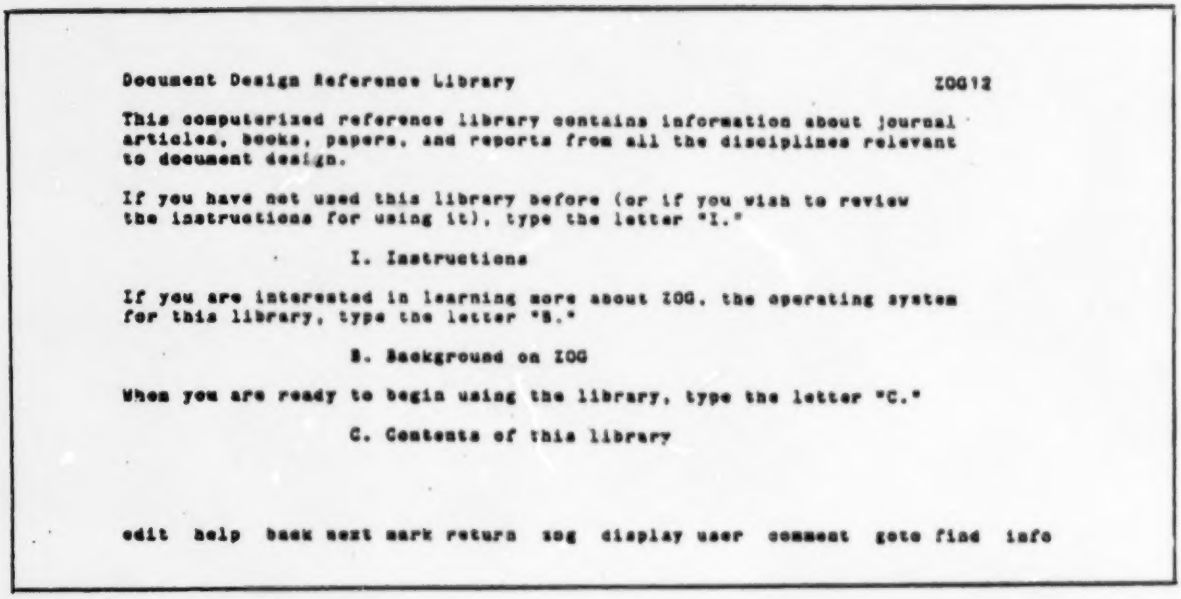

Document Design Reference Library ZOG12
This computerized reference library contains information about journal articles, books, papers, and reports from all the disciplines relevant to document design.
If you have not used this library before (or if you wish to review the instructions for using it), type the letter "I."
I. Instructions
If you are interested in learning more about ZOG, the operating system for this library, type the letter "B."
B. Background on ZOG
When you are ready to begin using the library, type the letter "C."
C. Contents of this library
edit help back next mark return zog display user comment goto find info

Figure 1: Frame ZOG12

The only things a user must know how to use in order to access the information in this net are options, local pads, and global pads.

Options. The options on a frame are indicated with a letter, number, or symbol, and they lead to another frame which gives more information about that item. The user chooses the option by typing its letter (usually upper-case), number, or symbol, and the frame to which it's linked then appears on the screen. (If the succeeding frame has not been built yet, this is indicated by a hyphen after the letter, number, or symbol.)

Local pads. The local pads on a frame also are indicated with a letter, number, or symbol, but they differ from options in that they are used to perform a special task (such as "go to top of index") rather than to lead to

another frame in the hierarchical structure of the net. The "next" command, explained below, does not apply to local pads. Local pads are distinguished from global pads (1) by their location (which can be any place above the global pads, whereas the global pads are always across the last line of the frame) and (2) by the fact that they may differ from frame to frame, whereas global pads are the same on all frames.

Global pads. In order to move through the net in several ways without going through options and to perform certain functions, global pads (also referred to as global commands) are provided. Each is explained below. The command is executed by typing the first letter (always lower-case) of the command--for example, "b" for "back."

- edit (edit current frame) - The "edit" global command is used to add, delete, or change information using ZED, the ZOG editor. A user interested only in reading the information contained in the net does not need this command.

- help (help in using global commands) - Frame Help! briefly explains the global commands which appear across the bottom of each frame, and you can go to Help! from any frame by typing an "h" for help. After you have reviewed the commands, you can return to the frame you were on previously by typing "b" for "back," as explained below.

- back (go back to last frame) - The "back" global command takes you back to the last frame you looked at. Another "back" will take you to the one you looked at before that, etc., so that you can retrace your steps. When you go back to a previous frame, there will be an asterisk beside the option you last selected.

- next (go to the next frame at the same level) - The "next" global command takes you to the next option on the same hierarchical level in the net. For example, if you had been at a frame about "Animals," which had the options "1. Cats" and "2. Dogs," you could pick Option 1 and then, after looking at that frame, type "n" to get Option 2. This would save you time, as you would not need to return to "Animals" and then choose Option 2.

- mark (mark the frame for later return) - The "mark" global command is a device by which you may mark a frame in case you wish to return to it later. While you are at the frame, type "m" for "mark." To get a list of the frames you have marked, use the "return" global command explained below.

- return (go to return stack of marked frames) - The "return" global command takes you to the frame called Return Stack, which lists the frames you have marked using the "mark" global command explained

above. If you type an "r" but have not marked any frames, you will go to the Backup Stack which automatically keeps track of all the frames you have looked at. While you are at the Return Stack, you have an option to clear the stack by deleting the marks you have made (type "-" and then answer the question which will appear, designating the marks to remove). When you are through looking at the list, type a "b" to go back to the frame you were on or a "g" to go to a frame on the list.

- zog (go to the root frame of the net) - You may return to the root frame of the net (Frame ZOG1) at any time by typing a "z" for ZOG. This is useful if you become lost in the net; if you want to read down through the net from the beginning, choosing options other than those you chose before; or if you want to use certain facilities of ZED, the ZOG editor.

- display (redisplay the frame) - The "display" global command redisplays the frame you are currently looking at, which is useful if the screen has become disorganized due to a message from the operator or for some other reason.

- user (show user-display area) - The "user" global command gives information on procedures performed during the current working session (frames deleted, etc.) This is useful to someone who is editing the net, but does not apply to someone who is only reading the net.

- comment (send comments to net maintainers) - The "comment" global command is used to send comments to people who maintain and build the net. After you type a "c" the computer will ask you to wait. Then it will ask you to type in the subject and then the message. After you type the message, hit the "ESC" key to indicate that you are done typing. The computer will ask you if you want to proceed sending the message; type an "s" for "send" or an "a" for "abort."

- goto (prompt for the frame to go to) - This global command is helpful if you know the number of a particular frame you want to see. To go to that frame without going through the levels of options, type a "g." A message will appear across the bottom of the screen: "Frame to go to:"; type in the number. After you have looked at that frame, you can return to the frame you were on previously by typing a "b" for "back."

- find (search net for string) - The "find" global command permits you to search for a string of characters in the net in a defined range or in the whole net. After you type an "f," a screen of options will appear.

    * Pick Option 1 and then type the string of characters you wish to search for.

    * If Options 2 through 4 apply, pick the option and then answer the question which will appear (they define the frames which will be searched).

* On Option 5 you specify whether you want whole frames or only the titles of the frames searched; if your choice is what is appearing beside Option 5, you don't need to do anything. If it is not, reverse the choice by simply typing "5."

* Pick Option 6 and then answer the question by typing either a return (which will indicate the whole net) or the name of the subnet to search. From this point on, use the suboptions under Option 6 (to begin, to continue, etc.).

* As the computer finds each occurrence of the string, it will list the frame and pause. You must then either type "c" to continue the search or "g" to go to the frame. (After looking at it, typing a "b" will take you back to the search frame and a "c" will then continue the search.)

* If you do not wish the computer to stop after each find, type an "f" for "find all" instead of an "s" to start the search (you can ask for a list of the frames, as explained below, when the search is completed).

* If you wish information (date created, etc.) on the frame after it is found, type an "i."

* You can redisplay the search frame itself by typing a "d"--this clears extra material such as messages.

* You can stop the search by typing a "q." After the search is completed but before you leave the frame, you can get a list of all the frames found (so that you do not have to keep a handwritten list as the search proceeds) by typing "l." Then, if more than 9 frames were found, type an "m" for more listings (only 9 are listed per frame).

- info (print information for current frame) - You may obtain information about the frame you are looking at by typing an "i." This includes such facts as the date the frame was created and by whom. The information will appear in a line across the bottom of the screen.

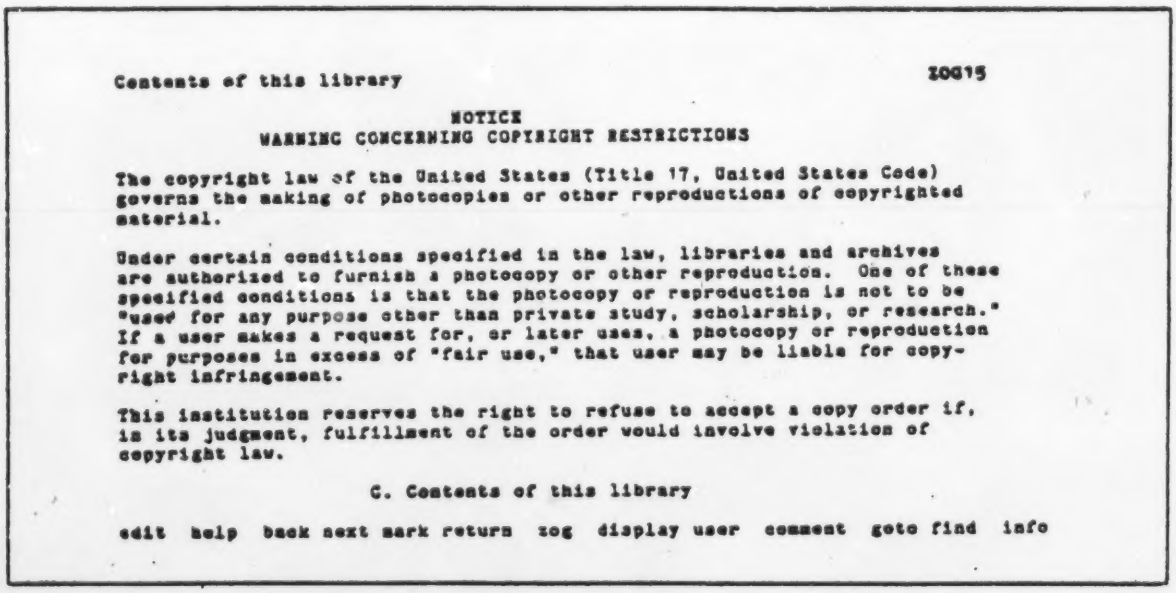
You will note that there is an option (I) on the first frame (Fig. 1) for obtaining instructions in using the system. When the user chooses this option, she is led through a series of frames giving the above information. Also, from any frame in the net, the user can execute the "help" global command (as explained above) by typing "h," and she will be given instructions on the use of the global commands.

THE CONTENTS OF THE LIBRARY

Following is a description of our reference library as we are originally implementing it. Our experience in using the library may result in modifications. Figure 1 shows the first frame which a user of the system will see on the screen of a video computer terminal.

In addition to instructions for using the system, the user can obtain information about ZOG by typing a "B."

When the user is ready to commence using the library, she will type a "C." The next frame which the user sees (Figure 2) is a copyright notice.



Contents of this library ZOG15

NOTICE
WARNING CONCERNING COPYRIGHT RESTRICTIONS

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material.

Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

This institution reserves the right to refuse to accept a copy order if, in its judgment, fulfillment of the order would involve violation of copyright law.

C. Contents of this library

edit help back next mark return zog display user comment goto find info

Figure 2: Frame ZOG15

The user again types a "C," and the frame shown in Figure 3 appears.

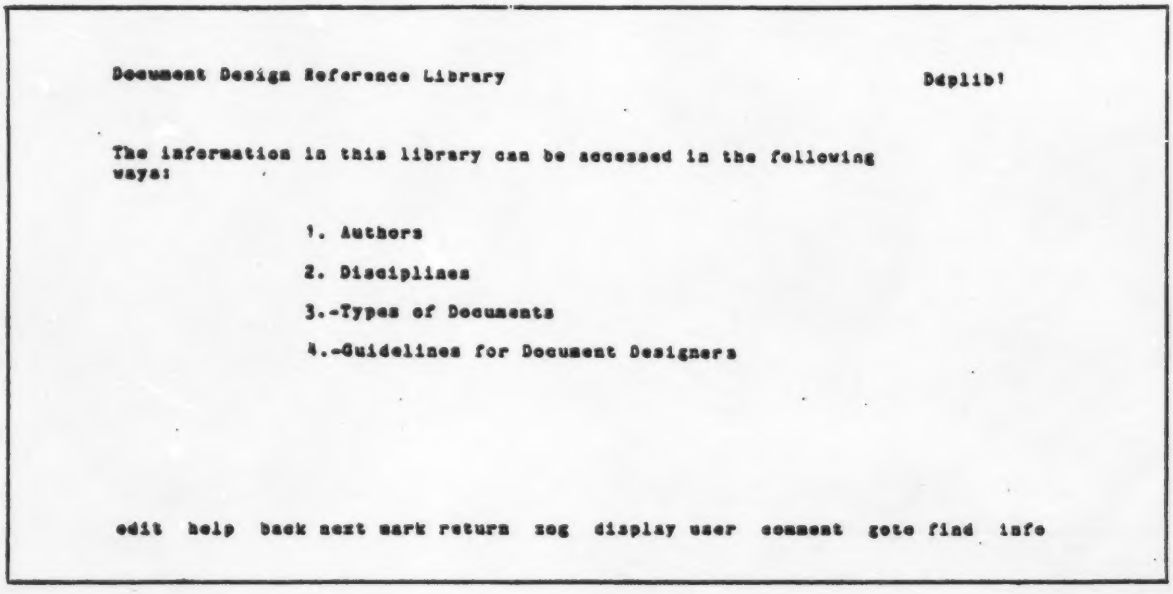

Document Design Reference Library
Ddplib1
The information in this library can be accessed in the following ways:
1. Authors
2. Disciplines
3.-Types of Documents
4.-Guidelines for Document Designers
edit help back next mark return zog display user comment goto find info

Figure 3: Frame Ddplib1

As shown in Figure 3, there are four ways to begin to access the material: author, discipline, type of document. or the guidelines for document designers.

1. Access by Author

If the user wishes to look for works by a particular author, she will indicate this choice by typing a "1" to select Option 1 (Authors) on Frame Ddplib1. The frame which will appear next (Figure 4) will contain the letters A through Z.

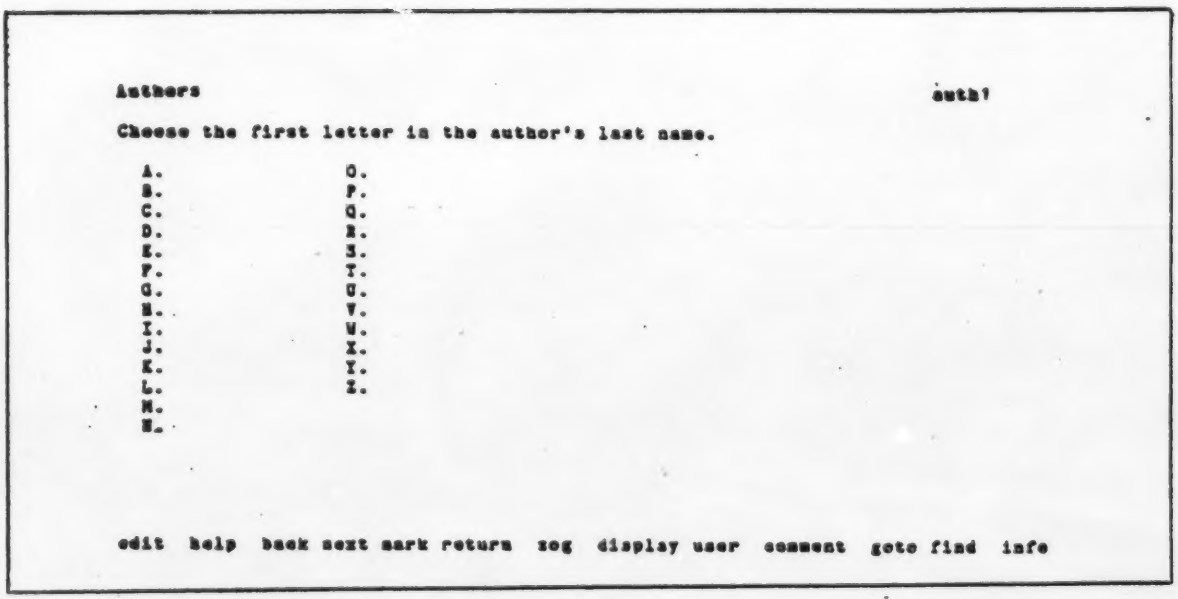


Figure 4: Frame auth1

The user will choose the letter with which the author's last name begins. If the user wishes to see articles by Patricia Wright, for example, she will choose Option W. A frame containing an alphabetical list of authors whose last name begins with W and whose works appear within the net will appear (Figure 5).

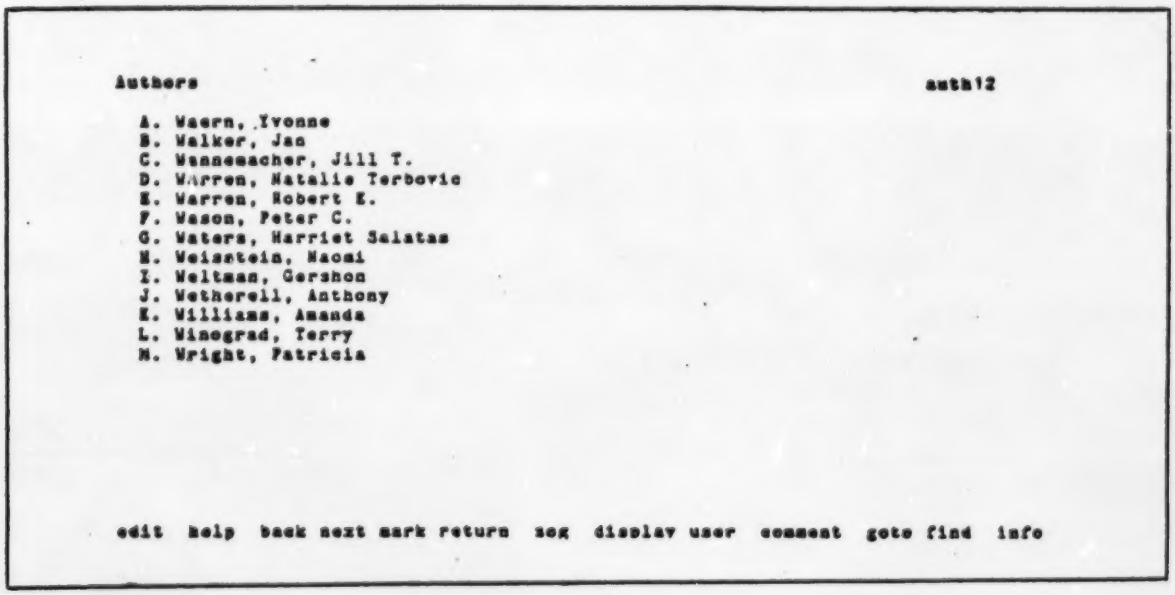


Figure 5: Frame auth12

The user will then choose Option M for Wright. A list of all the works by Wright which are included in this net will appear (Figure 6).

```
Wright, Patricia                                                    auth13

  1. Wright, Patricia, 1968.  Sentence retention and transformation theory
  2. Wright, Patricia, 1968.  Using tabulated information
  3. Wright, Patricia, Hull, A. J., and Conrad, R., 1969.  Performance
     tests with non-circular coins
  4. Wright, Patricia, 1969. Transformations and the understanding of
     sentences
  5. Wright, Patricia, 1969.  Two studies of the depth hypothesis
  6. Wright, Patricia, and Kahneman, Daniel, 1971.  Evidence for alternative
     strategies of sentence retention
  7. Wright, Patricia, 1971.  Linguistic description of auditory signals
  8. Wright, Patricia, 1971.  Writing to be understood:  Why use sentences?
  9. Wright, Patricia, and Fox, Kathryn, 1972.  Explicit and implicit
     tabulation formats


                M. Wright, Patricia (cont.)



edit  help  back next mark return  xeq  display user  comment  goto find  info
```

Figure 6: Frame auth13

Note that the system contains more works by Wright than can be listed on one frame. The user may choose to look at one of the references given on this frame, or she may choose Option M to see more references. Let's suppose that she chooses the latter--she will now see the frame shown in Figure 7.

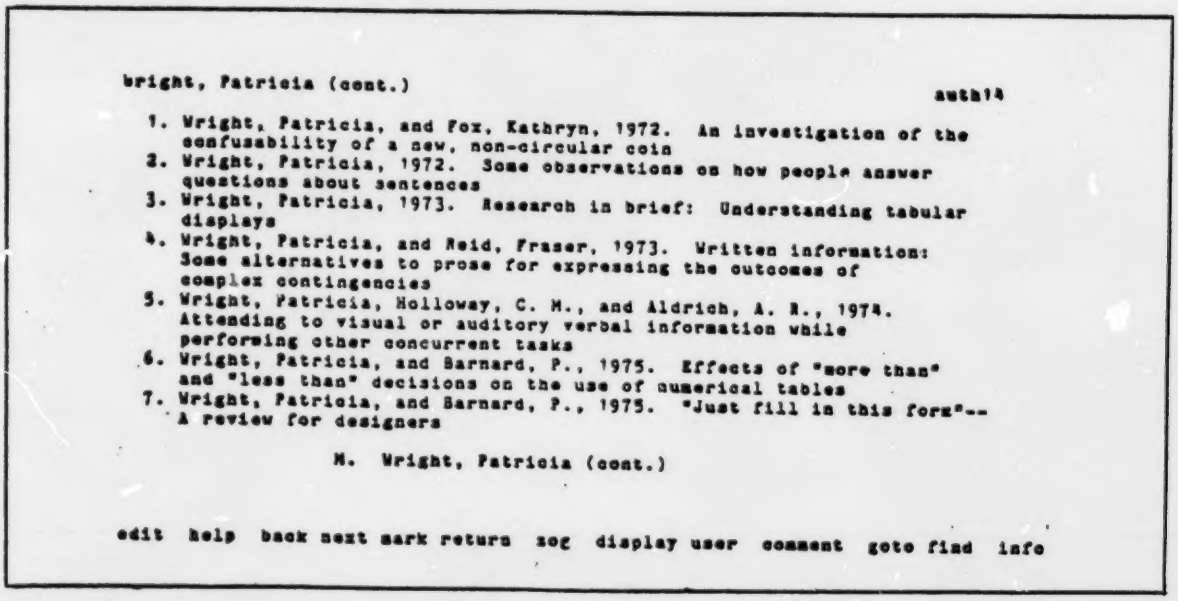

bright, Patricia (cont.)
auth14
1. Wright, Patricia, and Fox, Kathryn, 1972. An investigation of the confusability of a new, non-circular coin
2. Wright, Patricia, 1972. Some observations on how people answer questions about sentences
3. Wright, Patricia, 1973. Research in brief: Understanding tabular displays
4. Wright, Patricia, and Reid, Fraser, 1973. Written information: Some alternatives to prose for expressing the outcomes of complex contingencies
5. Wright, Patricia, Holloway, C. M., and Aldrich, A. R., 1974. Attending to visual or auditory verbal information while performing other concurrent tasks
6. Wright, Patricia, and Barnard, P., 1975. Effects of "more than" and "less than" decisions on the use of numerical tables
7. Wright, Patricia, and Barnard, P., 1975. "Just fill in this form"--A review for designers
M. Wright, Patricia (cont.)
edit help back next mark return log display user comment goto find info

Figure 7: Frame auth14

If the user wishes to see still more listings, she chooses Option M again and sees the frame shown in Figure 8.

There is no option for more references, indicating to the user that she is now at the end of the list of articles by Wright. If she wishes to return to the previous frame, she types a "b" for "back," and is returned to the previous list (see Figure 7 again).

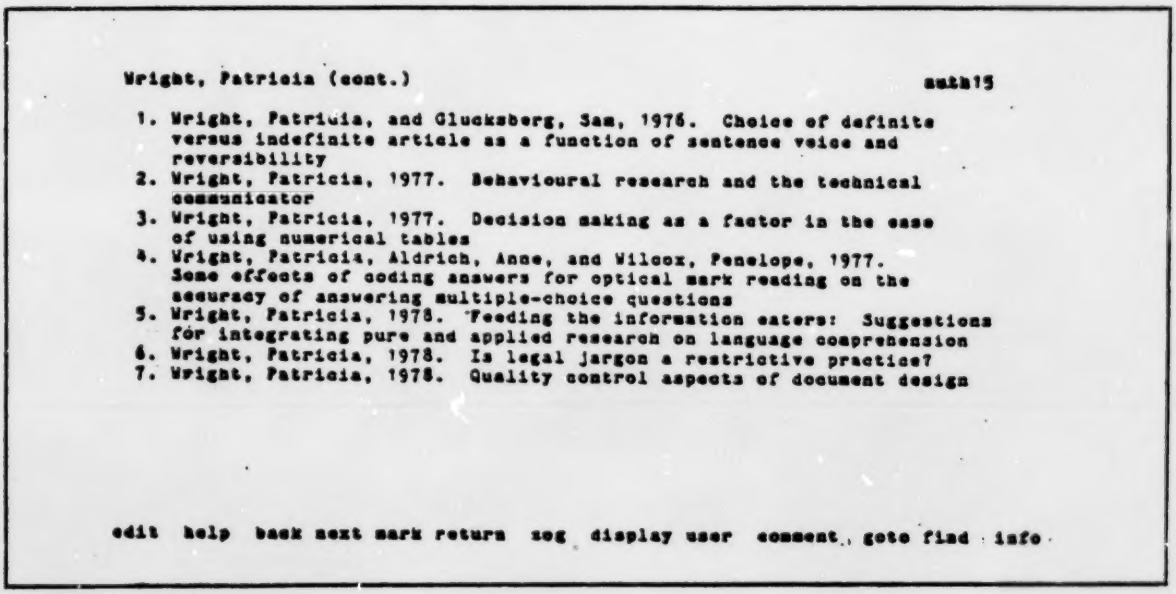

Wright, Patricia (cont.) auth15
1. Wright, Patricia, and Glucksberg, Sam, 1976. Choice of definite versus indefinite article as a function of sentence voice and reversibility
2. Wright, Patricia, 1977. Behavioural research and the technical communicator
3. Wright, Patricia, 1977. Decision making as a factor in the ease of using numerical tables
4. Wright, Patricia, Aldrich, Anne, and Wilcox, Penelope, 1977. Some effects of coding answers for optical mark reading on the accuracy of answering multiple-choice questions
5. Wright, Patricia, 1978. Feeding the information eaters: Suggestions for integrating pure and applied research on language comprehension
6. Wright, Patricia, 1978. Is legal jargon a restrictive practice?
7. Wright, Patricia, 1978. Quality control aspects of document design
edit help back next mark return log display user comment goto find info

Figure 8: Frame auth15

If she decides she would like to see No. 6 on the list (Effects of "more than" and "less than" decisions on the use of numerical tables), she would type "6." The next frame which appears (Figure 9) is the basic reference frame which is present for each article, book, or other reference in the net. It gives several pieces of information about the reference and options for more information. (This information is entered into the net from literature review forms completed by members of the Document Design Project. The form is shown in Figure 10.)

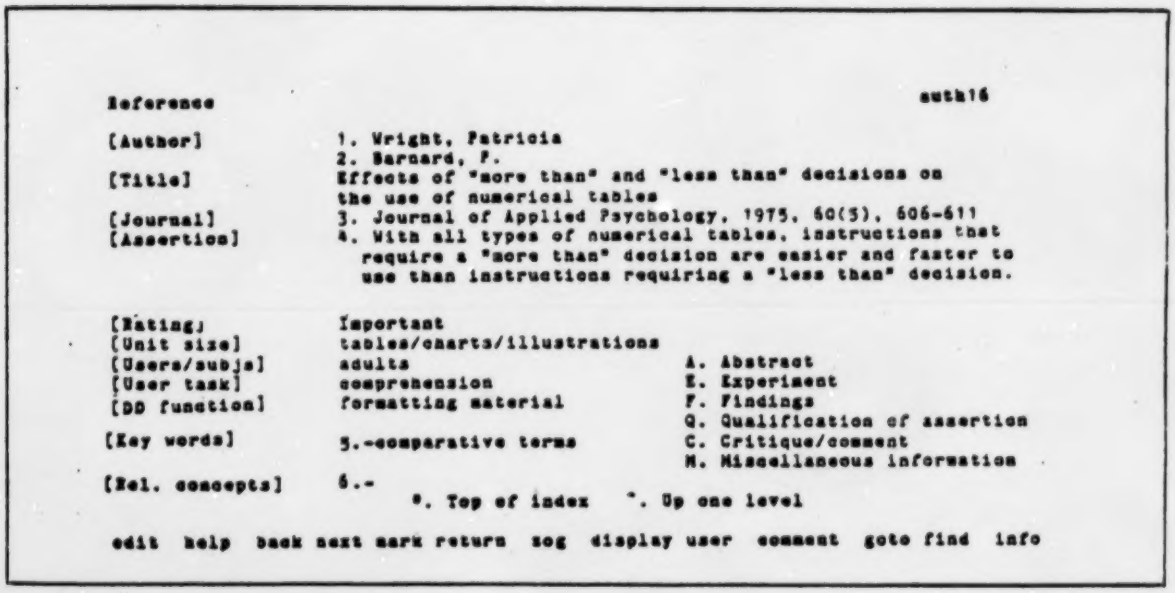


Figure 9: Frame auth16

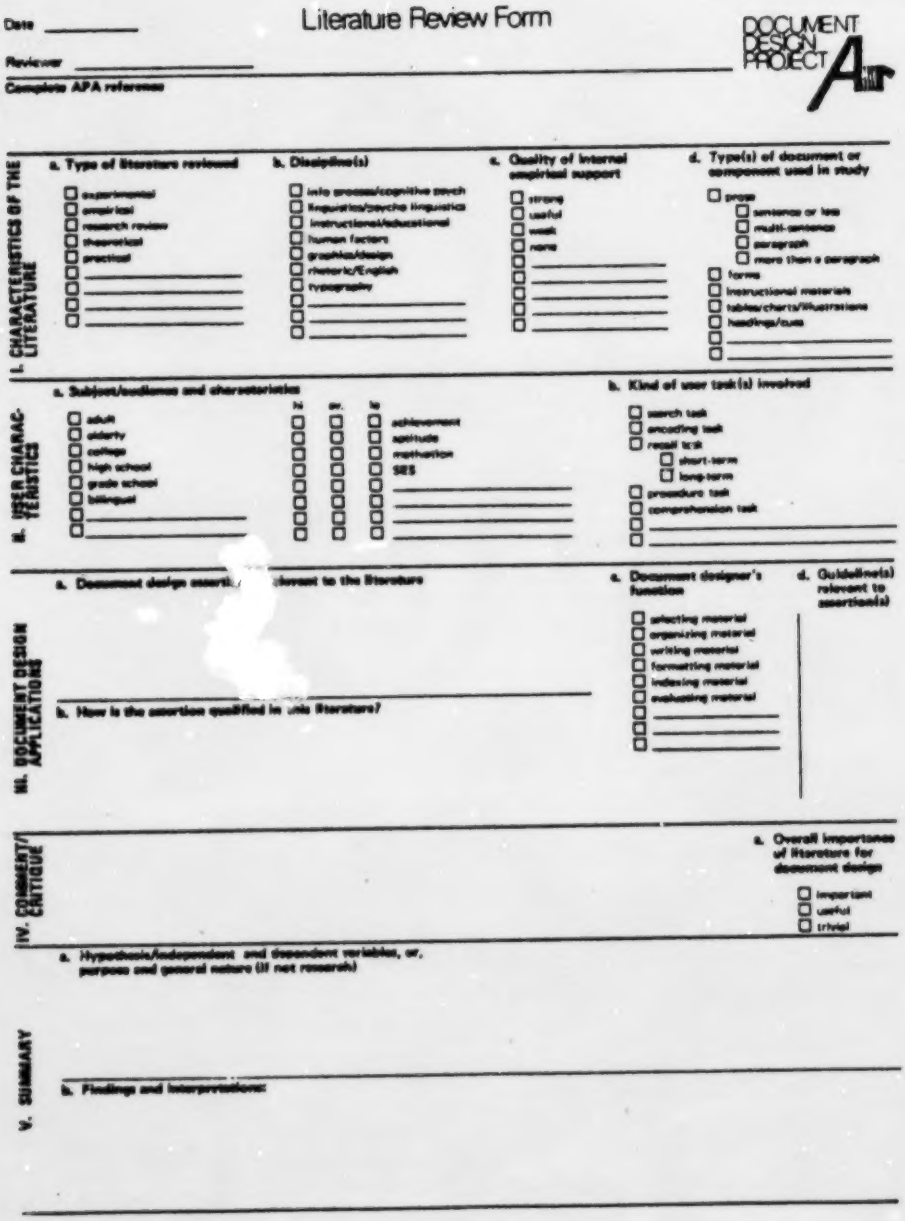


Figure 10: Literature Review Form

After reading the information on the basic reference frame, let's suppose that the user would like to see the author's abstract. She types an "A," and the frame containing the abstract will appear (Figure 11).

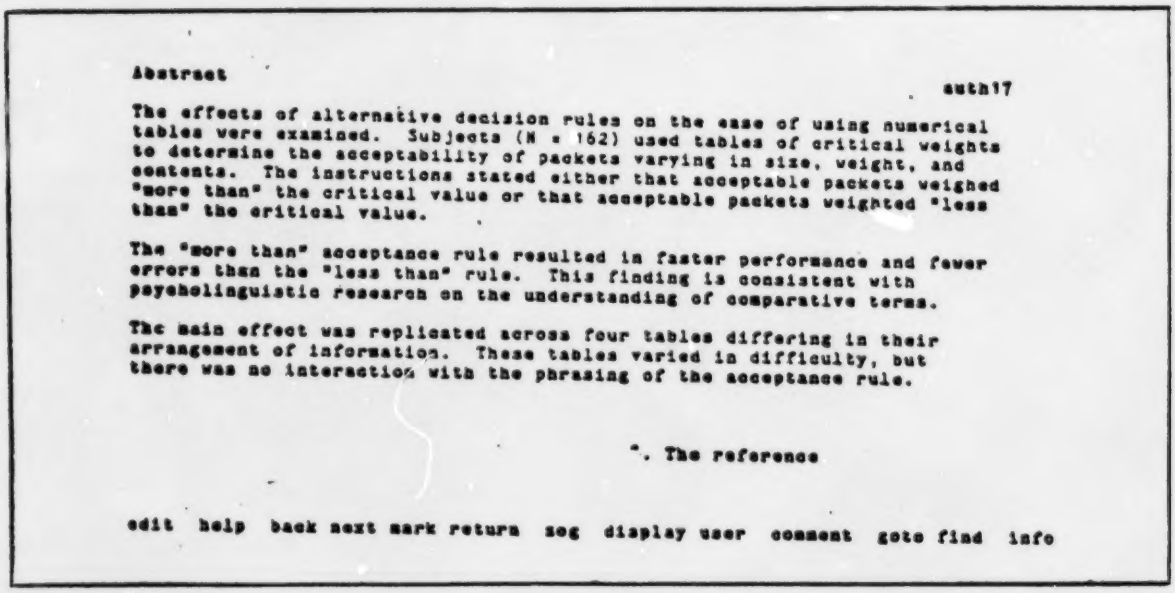

Abstract
auth17
The effects of alternative decision rules on the ease of using numerical tables were examined. Subjects (N = 162) used tables of critical weights to determine the acceptability of packets varying in size, weight, and contents. The instructions stated either that acceptable packets weighed "more than" the critical value or that acceptable packets weighted "less than" the critical value.
The "more than" acceptance rule resulted in faster performance and fewer errors than the "less than" rule. This finding is consistent with psycholinguistic research on the understanding of comparative terms.
The main effect was replicated across four tables differing in their arrangement of information. These tables varied in difficulty, but there was no interaction with the phrasing of the acceptance rule.
". The reference
edit help back next mark return seq display user comment goto find info

Figure 11: Frame auth17

After reading the abstract, the user may choose to continue reading all the information that is recorded about the article (that is, the rest of the options available on the reference frame shown in Fig. 9, such as Experiment, Findings, Qualifications of Assertion, etc.). She does not need to return to the reference frame to do this; as explained previously, she may use the "next" global command to get to the next option on the same hierarchical level. For example, "n" typed from the frame shown in Figure 11 would call up "Experiment," as shown in Figure 12.

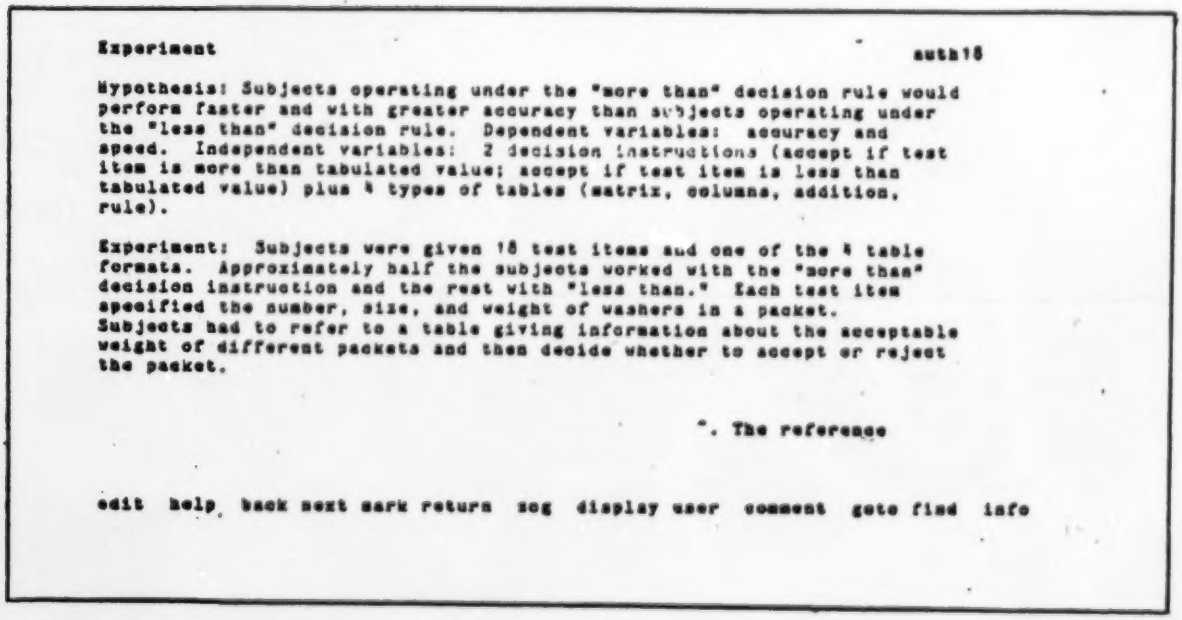

Experiment
auth18
Hypothesis: Subjects operating under the "more than" decision rule would perform faster and with greater accuracy than subjects operating under the "less than" decision rule. Dependent variables: accuracy and speed. Independent variables: 2 decision instructions (accept if test item is more than tabulated value; accept if test item is less than tabulated value) plus 4 types of tables (matrix, columns, addition, rule).
Experiment: Subjects were given 18 test items and one of the 4 table formats. Approximately half the subjects worked with the "more than" decision instruction and the rest with "less than." Each test item specified the number, size, and weight of washers in a packet. Subjects had to refer to a table giving information about the acceptable weight of different packets and then decide whether to accept or reject the packet.
". The reference
edit help back next mark return zog display user comment goto find info

Figure 12: Frame auth18

After reading about the experiment, the user may continue to explore the other options on the same hierarchical level (Findings, Qualification of Assertion, Critique/comment, and Miscellaneous Information) by continuing to type "n" for next. At any point she may return to the reference frame (Fig. 9) by typing the character "^."

From the basic reference frame, the user may also get additional information through several other options (any item with a number or letter on Figure 9). Option 1 or 2 will give her a list of the other works included in this net by either of the authors of this article. Option 3 will lead her to lists of other works appearing in the same journal. Option 4 will lead to frames showing the guideline for document designers which corresponds to this assertion, its applications and qualifications, and other references which apply to the guideline (see Section 4). Option 5 will lead to frames which list other key words, and Option 6, to frames listing related concepts in disciplines other than the one this article was written for (cognitive psychology).

Note that complete bibliographical information is given so that the user can locate a hard copy of the article in a conventional library if she wishes. Option M (Miscellaneous Information) includes the name of a local library where the journal is available.

From the basic reference frame (Figure 9) she may also choose to go up one level in the hierarchy by typing the character "^." The frame (Figure 13) would appear which shows other entries for the same type of literature (experimental) in the same discipline (information processing/cognitive psychology), dealing with the same unit (tables/charts/illustrations). In the next section we discuss accessing the information through this "discipline" path.

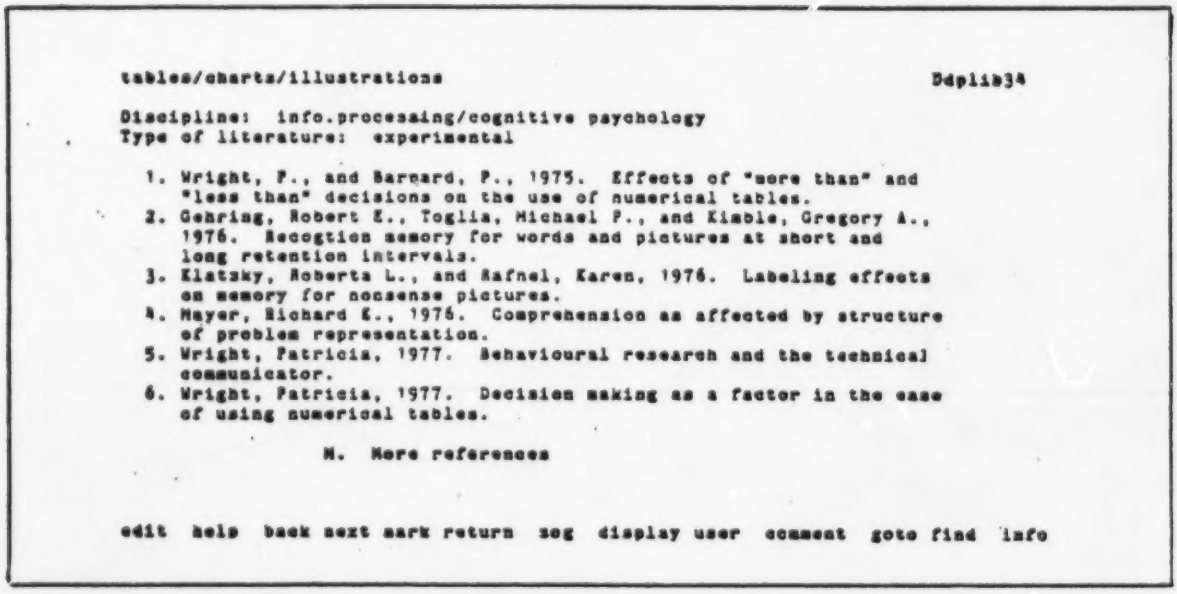

tables/charts/illustrations
Ddplib34
Discipline: info.processing/cognitive psychology
Type of literature: experimental
1. Wright, P., and Barnard, P., 1975. Effects of "more than" and "less than" decisions on the use of numerical tables.
2. Gehring, Robert E., Toglia, Michael P., and Kimble, Gregory A., 1976. Recognition memory for words and pictures at short and long retention intervals.
3. Klatzky, Roberta L., and Rafnel, Karen, 1976. Labeling effects on memory for nonsense pictures.
4. Mayer, Richard E., 1976. Comprehension as affected by structure of problem representation.
5. Wright, Patricia, 1977. Behavioural research and the technical communicator.
6. Wright, Patricia, 1977. Decision making as a factor in the ease of using numerical tables.
M. More references
edit help back next mark return sog display user comment goto find info

Figure 13: Frame Ddplib34

From the reference frame shown in Figure 9, the user could also have chosen to go to the top of the index by typing the character "*." The frame giving the choice of author, discipline, etc., would reappear (Figure 14).

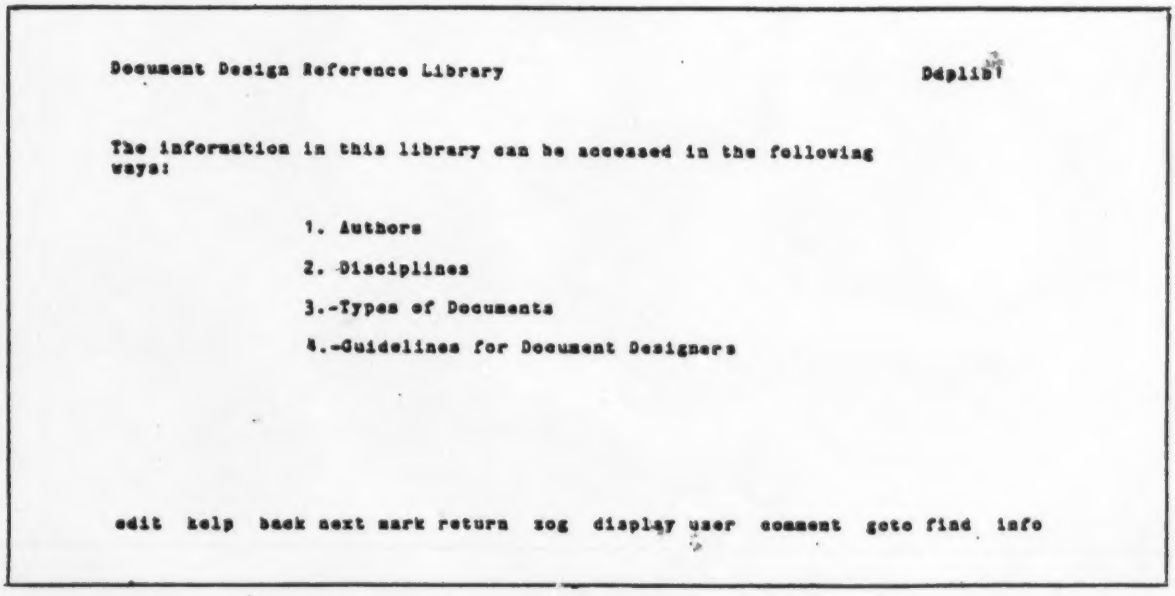

Document Design Reference Library
Ddplib1
The information in this library can be accessed in the following ways:
1. Authors
2. Disciplines
3.-Types of Documents
4.-Guidelines for Document Designers
edit help back next mark return zog display user comment goto find info

Figure 14: Frame Ddplib1

2. Access by Discipline

Let us suppose now that the user wishes to look for aticles within a certain discipline. From the frame shown in Figure 14, the user would now choose Option 2 for Discipline. The frame which would appear next (Figure 15) would list the disciplines covered by this reference library.

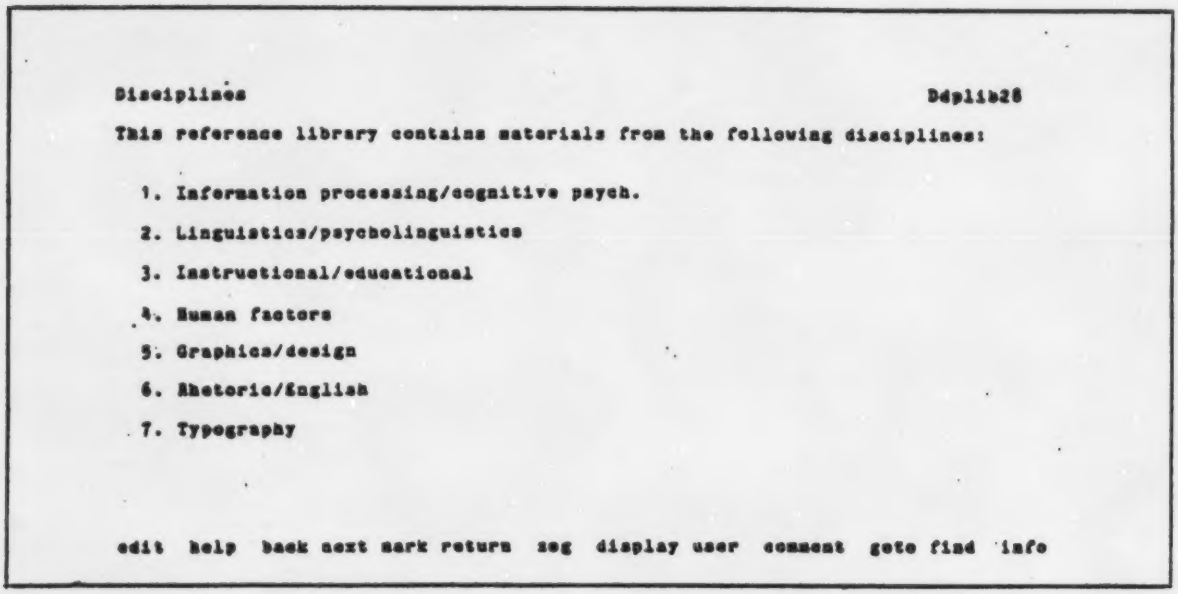


Figure 15: Frame Ddplib28

If the user wishes to pursue works in information processing/cognitive psychology, she will choose Option 1. The frame which will appear next (Figure 16) will list five types of literature.

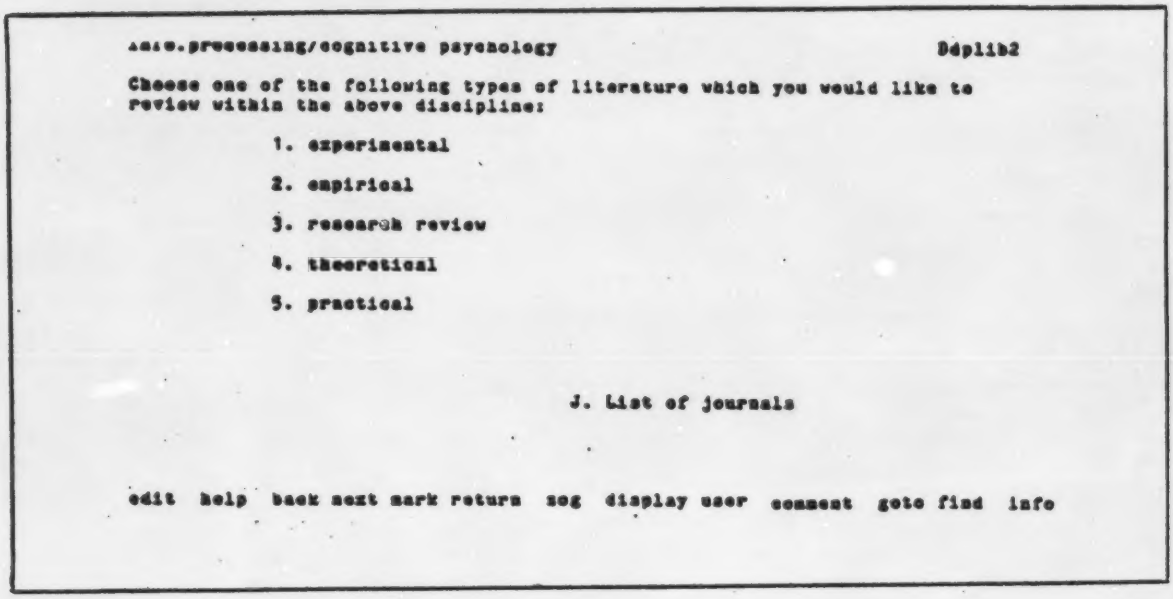

Info.processing/cognitive psychology
Ddplib2
Choose one of the following types of literature which you would like to review within the above discipline:
1. experimental
2. empirical
3. research review
4. theoretical
5. practical
J. List of journals
edit help back next mark return log display user comment goto find info

Figure 16: frame Ddplib2

If the user is interested in experimental literature, she will choose Option 1. (Note that the user may also review journals in the discipline; this will be explained later.) A list of document components will appear next (Figure 17).

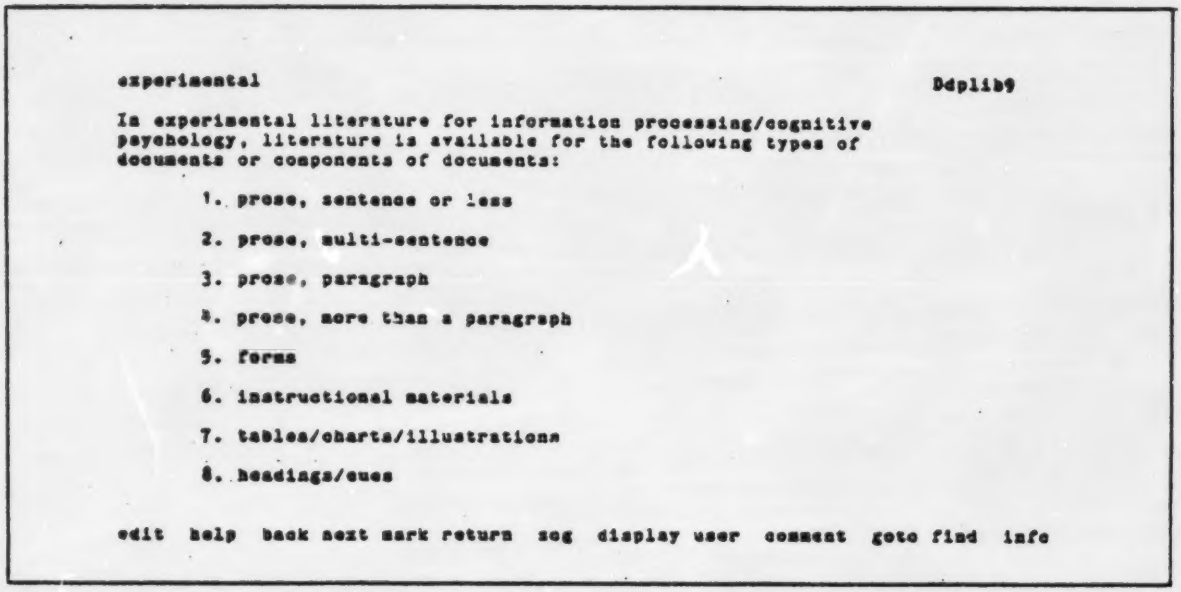

experimental
Ddplib9
In experimental literature for information processing/cognitive psychology, literature is available for the following types of documents or components of documents:
1. prose, sentence or less
2. prose, multi-sentence
3. prose, paragraph
4. prose, more than a paragraph
5. forms
6. instructional materials
7. tables/charts/illustrations
8. headings/cues
edit help back next mark return sog display user comment goto find info

Figure 17: Frame Ddplib9

Let's say that the user wishes to see experimental literature in information processing/cognitive psychology as it applies to tables, charts, and illustrations. She will choose Option 7. She will then see a list of works which fall under this classification (giving the author, date, and title, as shown in Figure 18).

```
tables/charts/illustrations                                    Ddplib34

Discipline:  info.processing/cognitive psychology
Type of literature:  experimental

  1. Wright, P., and Barnard, P., 1975.  Effects of "more than" and
     "less than" decisions on the use of numerical tables.
  2. Gehring, Robert E., Toglia, Michael P., and Kimble, Gregory A.,
     1976.  Recogtion memory for words and pictures at short and
     long retention intervals.
  3. Klatzky, Roberta L., and Rafnel, Karen, 1976.  Labeling effects
     on memory for nonsense pictures.
  4. Mayer, Richard E., 1976.  Comprehension as affected by structure
     of problem representation.
  5. Wright, Patricia, 1977.  Behavioural research and the technical
     communicator.
  6. Wright, Patricia, 1977.  Decision making as a factor in the ease
     of using numerical tables.

                    M.  More references


edit  help  back  next  mark  return  sog  display  user  comment  goto  find  info
```

Figure 18: Frame Ddplib34

She may review any reference on the list by typing its option number. For example, if she wishes to look at the article by Wright and Barnard in 1975 (the example used previously in the "author" path), she would choose Option 1. The user would now see the basic reference frame for that article (Figure 19).

```
Reference                                                    auth16

[Author]          1. Wright, Patricia
                  2. Barnard, P.
[Title]           Effects of "more than" and "less than" decisions on
                  the use of numerical tables
[Journal]         3. Journal of Applied Psychology, 1975, 60(5), 606-611
[Assertion]       4. With all types of numerical tables, instructions that
                     require a "more than" decision are easier and faster to
                     use than instructions requiring a "less than" decision.

[Rating:          Important
[Unit size]       tables/charts/illustrations
[Users/subjs]     adults                          A. Abstract
[User task]       comprehension                   E. Experiment
[DD function]     formatting material             F. Findings
                                                  Q. Qualification of assertion
[Key words]       5.-comparative terms            C. Critique/comment
                                                  M. Miscellaneous information
[Rel. concepts]   6.-
                        *. Top of index    ^. Up one level

 edit  help  back next mark return  sog  display user  comment  goto find  info
```

Figure 19: Frame auth16

As before, the user may choose any of the options to obtain more information, she may go back to the top of the index (giving a choice of access by author, discipline, etc.) by typing "*," or she may go up one level (to other works under the same classification) by typing "^." Also, from this or any other frame, she may retrace her steps by using the "back" global command; by typing a "b" at each frame, she will be taken back through the frames she had selected previously (Figures 18, 17, 16, etc.). At any point along the way she could choose other options. For example, if she moved back to the frame shown in Figure 17, she could now investigate headings and cues by choosing Option 8.

You will recall that the frame which listed the types of literature for a particular discipline also included an option for the journals of that discipline. Let's suppose that the user had chosen human factors as the discipline and was at the frame shown in Figure 20.

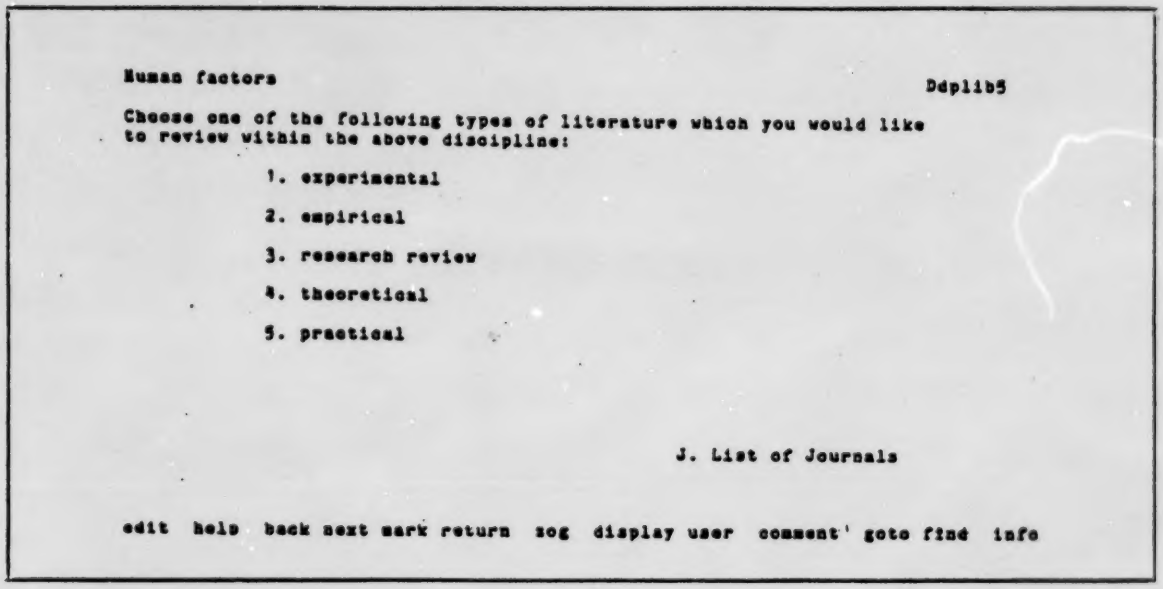

Human factors
Ddplib5
Choose one of the following types of literature which you would like to review within the above discipline:
1. experimental
2. empirical
3. research review
4. theoretical
5. practical
J. List of Journals
edit help back next mark return log display user comment' goto find info

Figure 20: Frame Ddplib5

She can obtain a list of journals in human factors by typing "J" (Figure 21).

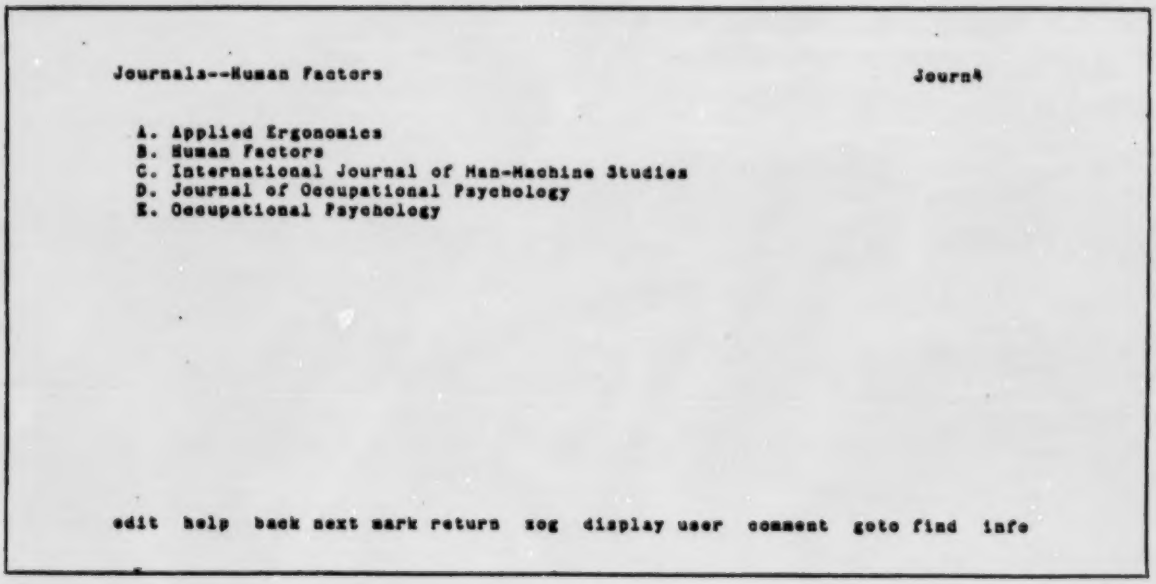

Journals--Human Factors
Journ4
A. Applied Ergonomics
B. Human Factors
C. International Journal of Man-Machine Studies
D. Journal of Occupational Psychology
E. Occupational Psychology
edit help back next mark return zog display user comment goto find info

Figure 21: Frame Journ4

By choosing one of the journals shown on the frame in Figure 21, the user would be referred to a list of articles from that journal which are relevant to document design.

3. Access by Type of Document

Let us suppose that the user is confronted with the task of constructing or improving a particular document. She can obtain information which pertains directly to the task at hand by accessing the system through the type of document. This is Option 3 on the top-of-index frame (shown again in Figure 22).

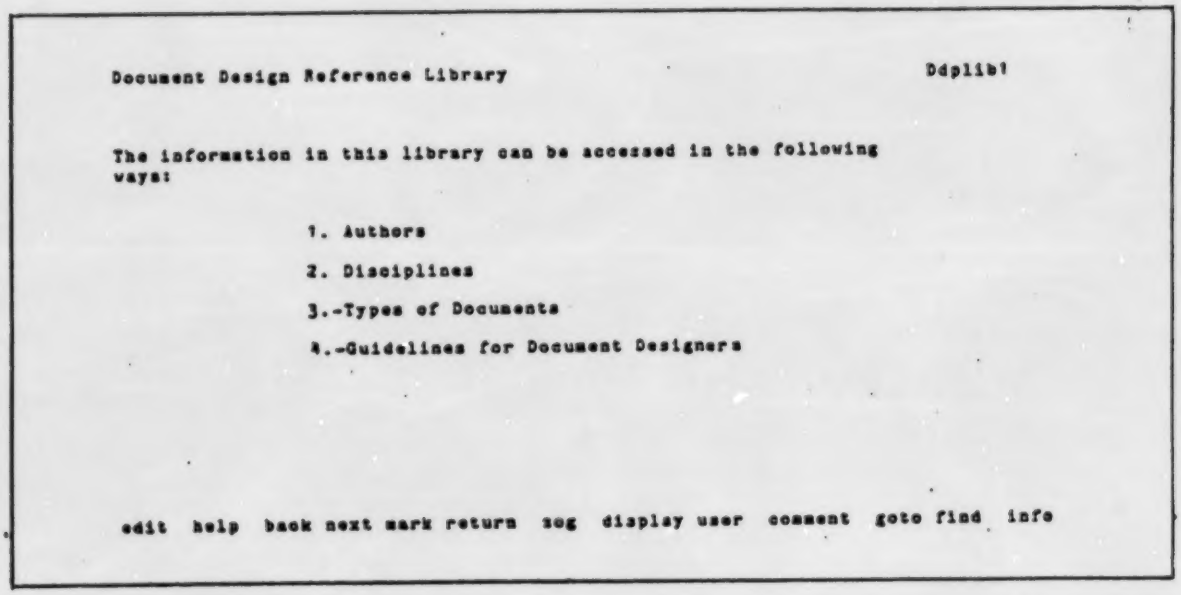

Document Design Reference Library
Ddplib1
The information in this library can be accessed in the following ways:
1. Authors
2. Disciplines
3.-Types of Documents
4.-Guidelines for Document Designers
edit help back next mark return seq display user comment goto find info

Figure 22: Frame Ddplib1

If the user chose Option 3, she would then see a list of the types of documents. From there she could explore the relevant guidelines and the

references which pertain to them.

This part of our system is not built yet. As our research gives us more knowledge about how documents should be classified and what the appropriate guidelines are, we will link this information to the rest of the system.

4. Access by Guidelines for Document Designers

The Document Design Project is conducting a three-year study to develop research-supported guidelines for document designers. The final product will include instructions on how to apply a select set of guidelines and the qualifications of each guideline for different document-user populations.

Many references in the net include an assertion (a statement about a document design practice that can be empirically tested). As explained previously, by choosing the option for the assertion from the basic reference frame (Figure 9) the user is led to frames which show the corresponding guideline, its applications and qualifications, and other references in the net that apply to that guideline.

From the top-of-index frame (Figure 22), the user may directly access the guidelines by choosing Option 4. She may then select frames that give the applications and qualifications, etc.

This part of the net will be filled in as our research into guidelines continues.

References

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Mantei, M., and McCracken, D. Issue analysis with ZOG, a highly interactive man-machine interface. In Proceedings of the First International Symposium on Policy Analysis and Information Systems. Durham, N.C.: Duke University, June 1979.

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Robertson, G. Some design considerations for the ZOG man-computer interface. In Proceedings of the Third NATO Advanced Study Institute on Information Science. Chania, Crete, Greece, August 1978.

Robertson, G., McCracken, D., and Newell, A. The ZOG approach to man-machine communication (Technical Report CMU-CS-79-148). Pittsburgh, Pa.: Computer Science Department, Carnegie-Mellon University, October 23, 1979. To appear in International Journal of Man-Machine Studies.